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10/506,717

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Takeo Yamaguchi

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EXAMINER

CHU, HELEN OK

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/506,717	<b>Applicant(s)</b> YAMAGUCHI ET AL.	
	<b>Examiner</b> Helen O. Chu	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 May 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,4,7-22,24,26,27 and 29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4,7-22,24,26,29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Applicant's amendment has been received on 5/7/2009. Claims 1, 14-17, 19, 21, 24 have been amended. Claim 2, 3, 23, 25 have been cancelled.

#### ***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/7/09 has been entered.

#### ***Claim Analysis***

3. It is noted that claims 1, 14, 17, 24 have "intended use" language such as "and a thermal shrinkage ratio of +/- 1% or less upon thermal treatment at 105 degrees Celsius for 8 hours" and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Masham, 2 USPQ2d 1647 (1987). The recitation states that the thermal treatment is optional and only when the thermal treatment proceeds, the shrinkage ratio is relevant. Therefore, the recitation is considered an intended use language.

#### ***Claim Rejections - 35 USC § 102/103***

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4. The rejections under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takeo et al. on claims 1, 4, 7-13, 24, 26, 27 are maintained. The rejection is repeated below for convenience.

5. The rejections under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takeo et al. on claims 14, 18, 21, 22, are withdrawn because the Applicants amended the claims.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 4, 7-13, 24, 26, 27, 29 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takeo et al. (EP 1 202 365).

In regards to claims 1, 4, 7-9, 11-13, the Takeo et al. reference a process of making and a product of a direct methanol solid polymer fuel cell which comprises a porous (Figure 1 and 2) polyimide (Paragraph 17) and electrolyte with two or more proton conductive monomers can be used to produce a co-polymer (Paragraph 23-25).

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The Takeo et al. discloses the porous substrate is swell resistant (Abstract) that is normalized 1.2 or less and 0.2 or more (Paragraph 26). Porous substrate undergoes pervaporation at 25 C. The Takeo et al. discloses a porous substrate with an average pore diameter to be 0.001 to 100.mu.m, the porosity to be between 10-95% and a thickness of 100.mu.m (Paragraph 4). The Takeo et al. reference also discloses a heat resistance at a temperature of higher than 130 degrees Celsius (P61) but does not disclose a heat resistance of a temperature of higher than 200 degrees Celsius, however, for the range higher than 130 degrees but less than or equal to 200 degrees Celsius, it is the Examiner's position that the amounts in question are so close that it is a prima facie obvious that one skilled in the art would have expected them to have the same properties *Titanium Metals Corp. v. Banner*, 227 USPQ 773. The range over 130 degrees Celsius which encompasses over 200 degree is anticipated.

In regards to claim 10, the proton conductivity of the electrolyte membrane 0.001S/cm and not higher than 10.0 S/cm at 25 C and 100% humidity is an inherent trait of the invention by Takeo et al, since the invention by Takeo et al. and the Applicants invention is the same. Further it is known in the art that proton conductivity of Nafion is approximately  $7.8 * 10^{-2}$  S/cm. The Takeo et al. discloses that the proton conductivity of the invention is improved over Nafion (Paragraph 61) , therefore, it would be obvious that the proton conductivity of the invention by Takeo et al. is in the range of 0.001 S/cm and 10.0 S/cm. Please note that Paragraph 58 tested the invention in a mixture of water

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and methanol under its equilibrium vapor pressure or supersaturated state. Under the equilibrium vapor pressure incorporates 100% humidity.

In regards to claim 24, 26, 27, the Takeo et al. reference discloses a fuel cell having a proton conductivity of between 0.001 S/cm to 10.0 S/cm at 25 degree Celsius in 100% humidity that is swelling resistant. Since the electrolyte membrane as disclosed by Takeo et al. is the same as invention of the Applicants, the intrinsic property of 0.01m<sup>2</sup>h/kg.mu.m to 10.0 m<sup>2</sup>h/kg.mu.m must also be the same.

It is noted that claims 1, 24, 29, the Takeo reference does not disclose that the polyimide is obtained from biphenyltetracarboxylic acid dianhydrides as tetracarboxylic acid components and diamines selected from the group consisting of diamines represented by following general formulae (1) to (3), however, these are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since electrolyte membrane is the same invention to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

***Claim Rejections - 35 USC § 103***

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8. The rejections under 35 U.S.C 103(a) as obvious over Takeo et al. on claims 2, 3, 15 are withdrawn because the Applicants amended the claims.

9. The rejections under 35 U.S.C 103(a) as obvious over Takeo et al. in view of Yamaguchi et al. on claims 16, 17, 19 and 20 are withdrawn because the Applicants amended the claims.

10. The rejections under 35 U.S.C 103(a) as obvious over Takeo et al. in view of Brunner et al. on claims 20, 23, 29 are withdrawn because the Applicants amended the claims.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 14-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo et al. (EP 1 202 365) in view of Brunner (US Patent 3,542,703)

Regarding claim 14, 16, 17, 22 the Takeo et al. reference discloses a method of for producing an electrolyte membrane comprising a porous polyimide substrate filled with electrolytic substance. The electrolyte substance is graft polymer consisting of monomer each having an ion-exchange group is formed at the inner surfaces of the pores. The grafting polymerization of the electrolyte monomers can be formed by plasma-irradiation (Applicants step X-4)the polyimide substrate in the monomer solution (Applicant's filing the monomer into pores of the substrate and step (Y-1)) and bubbling in inert gas in temperature of 20-100 Celsius (Applicant's heating the monomer to

polymerizing) (P31-P32) . The Takeo et al. reference discloses the porous substrate with an average pore diameter to be 0.001 to 100.mu.m. The Takeo et al. reference also discloses a heat resistance at a temperature of higher than 130 degrees Celsius (P61) which incorporates over 200 degrees Celsius.

Since the polyimide substrate is porous it is inherent that the polyimide substrate has a network structure that is composed of polymer phase and void phase inside thereof and forming microscopic continuous holes and the porous substrate has porous structure on both surfaces.

The Takeo reference does not disclose 1) wherein the porous polymer substrate consists of a polyimide that is obtained from 3, 3', 4, 4' – biphenyltetracarboxylic acid dianhydride as a tetra carboxylic acid component and oxydianiline as a diamine component and 2) a thermal shrinkage ratio of plus or minus 1% or less upon thermal treatment at 105 degrees Celsius for 8 hrs.

However, the Brunner et al. reference discloses a method of making a polyimide porous substrate by heating 3, 3', 4, 4' – biphenyltetracarboxylic acid dianhydride as a tetra carboxylic acid component and oxydianiline as a diamine component. By utilizing this method of producing a polyimide porous substrate, the substrate will improve the ability of impregnation by solutions (2:30-35), therefore, it would be obvious to one skilled in the art at the time the invention was made to incorporate the porous polyimide substrate made by the process as disclosed by the Brunner et al. reference into the method of making the electrolyte membrane requiring a porous polyimide substrate impregnated with electrolyte as disclosed by the Takeo reference to improve



impregnation properties of the porous polyimide substrate to obtain higher electrolyte retention resulting in higher conductivity.

The Takeo reference and the Brunner reference does not disclose a thermal shrinkage ratio of plus or minus 1% or less upon thermal treatment at 105 degrees Celsius for 8 hrs, however, it is the position of the Office that such properties are inherent, given that Takeo in view of Brunner et al. and the present application utilizes the same method in making an electrolyte membrane. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999). Where the claimed and prior art products are identical or substantially identical in structure or composition or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. *MPEP2112.01 I*

In regards to claim 15, the Takeo et al. reference discloses a step of heating the monomer to polymerize the monomer however, the Takeo et al. does not disclose repeating the same step again. In general the transposition of process steps or the splitting of one step into two, where the processes are substantially identical or equivalent in terms of function was held to be not patentably distinguish the processes. *Ex parte Rubin* 128 USPQ 159 (PO BDPatApp 1959).

In regards to claim 18, The membrane resists swelling (Abstract) and therefore, cannot be swollen with methanol or water.

Regarding claim 19, the Takeo reference disclose that silane coupler or the like to polymerize the monomers (P21)

Regarding claim 20, the Takeo reference discloses that the monomers are polymerized but does not disclose if the monomers form cross-linked polymers, however, monomers have only three ways of polymerizing monomers. The three ways are to crosslink, uncrosslink or comprises both crosslink or uncrosslink polymers. If a person of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, §103 likely bars its patentability. **KSR v. Teleflex**

Regarding claim 21, the Takeo reference discloses that the electrolytic substance is chemically bound to the interface of the porous polyimide substrate by the step of heating the monomer to polymerize (P21)

### ***Response to Arguments***

13. Applicant's arguments filed 4/7/09 have been fully considered but they are not persuasive.

A) The Applicants argue, *"The Examiner notes that Claims 1, 14, 17, and 24 have language based on an intended use, particularly with regard to a recited thermal shrinkage ratio in case of thermal treatment at 105°C for 8 hours. Because the Examiner believes that language of the claims is optional with regard to the thermal treatment, the Examiner has not considered the thermal treatment as a limitation of the claims. As amended, Claims 1, 14, 17, and 24 positively recite that the thermal shrinkage ratio occurs upon thermal treatment at 105°C for 8 hours, thus positively*

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*reciting the thermal treatment as a feature of the claims.*" However, as it is claimed in the product limitations, the recitation "*the thermal shrinkage ratio occurs upon thermal treatment at 105°C for 8 hours*" still recites intended use of the product, that is, if the substrate does not undergo a process of thermal treatment for treatment at 105°C for 8 hours, no thermal shrinkage will occur. However, these limitations were examined under the method claims as an intrinsic property of the polyimide substrate.

B) Applicants argue, "*The independent claims at issue in this rejection, Claims 1, 14, and 24, all recite specific species (or genera) of polyimide compounds useful for making electrolytic membranes for fuel cells. The Examiner relies on Takeo et al. as teaching a product and process for making a fuel cell comprising a porous polyimide electrolyte. It is asserted that Takeo et al. teaches a broad genus that includes polyimide materials useful for making porous fuel cell materials. However, for the following reasons, the disclosure of such a broad genus is not anticipatory nor does it make obvious the specific species and narrow genera recited in Claims 1, 14, and 24 and those claims depending therefrom...The Takeo et al. reference only mentions polyimide once in the reference (at ¶ [0017]) and does not teach any specific embodiments that include polyimides. Thus, Takeo et al. teaches an almost infinite number of polyimides but teaches no specific examples of such polyimides. Because the invention as set forth in Claims 1, 14, and 24 and claims depending therefrom recite specific species of polyimides that are not taught or suggested by Takeo et al. (and thus cannot be "at once envisage"), it is submitted that the reference is not anticipatory*" However, claim 1 and 24 are product claims and the newly amended recitation recites a product-by-

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produce limitations. Again, “Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Since electrolyte membrane is the same invention to that of the Applicant's, Applicant's process is not given patentable weight in this claim.” Claim 14 is a process claim and the process in which the product was made was considered. Please refer to the rejection above. Polyimide is recited again in claim 5 of the Takeo reference. In addition to, the claim product of Applicant's claimed invention broadly recites a polyimide, there is no species recited in the final product and was interpreted as such. In agreement specific compounds where used to make the final product, however when analyzing a product-by-process claim, the patentability does not depend on its method of production. Furthermore, the Takeo reference teaches the product and the method of making and electrolyte membrane comprising a polyimide porous substrate with electrolytic solution impregnated. The Takeo does not disclose the method of making a porous polyimide substrate in which the Brunner et al. reference cures these deficiencies. A patent for a combination, which only unites old elements with no change in their respective functions, obviously withdraws what is already known into the field of its monopoly and diminishes the resources available to skillful men. Where the combination of old elements performed a useful function, but it added nothing to the

nature and quality of the subject matter already patented, the patent failed under §103. When a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious. **KSR v. Teleflex**

C) Claim 2 and 3 have been cancelled and therefore the rejections are withdrawn. Claim 15 depend on claim 14 and was rejected by Takeo in view of Brunner.

D) It appears the Applicants argue the rejections of claims 16, 17, 19, based on the same arguments of claim 14. These arguments will not be addressed herein, please refer to the Response to arguments above.

E) The Applicants arguments regarding claims 20 have been considered, however, please refer to the rejection above in view of the Applicants amendments.

F) Regarding to the Applicants arguments for claim 29, please refer to the rejection above in view of the Applicants amendments.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOC

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795